Patient and Family Involvement

Can Patient Safety Be Measured by Surveys of Patient Experiences?

Leif I. Solberg, M.D.; Stephen E. Asche, M.A.; Beth M. Averbeck, M.D.; Anita M. Hayek, R.N.; Kay G. Schmitt, M.S.; Tim C. Lindquist, R.N.; Richard R. Carlson, M.S.

The 1999 Institute of Medicine (IOM) report on the frequency and seriousness of medical errors created a public furor,[1] especially the extrapolation that between 44,000 and 98,000 Americans die each year as a result of medical errors during hospital stays.[2–4] Although there has been controversy about the methods and analyses used to create these incidence estimates, there is no doubt that the rate is unacceptably high.[5–8] Ironically, although the IOM recommended a 50% reduction in errors during the next five years, neither the IOM nor most subsequent commentaries about this problem have called for the development of measures of errors or adverse events. Instead, most attention has been focused on reporting systems and an organizational culture supportive of such reporting. In a review of the state of measures for assessing and reporting on patient safety, Zhan et al. reported, "Available data and measures for patient safety assessment in the nation are inadequate, especially for comparing regions and subpopulations and for trend analysis."[9(p. 142)] Pronovost, Miller, and Wachter have proposed possible measures of hospital safety but agree that the current absence of measures prevents any credible answer to the question, "Are patients safer now?"[10]

Fortunately, the next IOM report, *Crossing the Quality Chasm,* identified patient safety as one of the six key dimensions of quality health care.[11] This allowed a more balanced approach to the study and correction of errors, one that uses the tools and concepts that have been developed for quality improvement and performance reporting. In that context, measurement is a critical component, and having a way to obtain reliable, valid, feasible, and repeatable rates is necessary for internal improvement, external accountability, and research into underlying causes and mechanisms.[12–16]

The problem is that the measures of errors used in the IOM errors report were very expensive and labor intensive. As such, they cannot be used for either monitoring change over time or guiding improvement by care delivery organizations. Moreover, those measures were restricted to the inpatient setting, with uncertain applicability to ambulatory care. As a result, we still

Article-at-a-Glance

Background: A study was conducted to test whether patient reports of medical errors via surveys could produce sufficiently accurate information to be used as a measure of patient safety.

Methods: A survey mailed regularly by a large multispecialty medical group to recent patients to assess their satisfaction and error experiences was expanded to collect more details about the patient-perceived errors. Following an initial mailing to 3,109 patients and parents of child patients soon after they had office visits in June 2005, usable mailed or phone follow-up responses were obtained from 1,998 respondents (65.1% adjusted). Responses were reviewed through a two-stage process that included chart audits and implicit physician reviewer judgments. The analysis categorized the review results and compared patient-reported errors with satisfaction.

Results: Of the 1,998 respondents, 219 (11.0%) reported 247 separate incidents, for a rate of 12.4 errors per 100 patients. After complete review, only 5 (2.0%) of these incidents were judged to be real clinician errors. Most appeared to represent misunderstandings or behavior/communication problems, but 15.4% lacked sufficient information to categorize. Women, Hispanics, and those aged 41–60 years were most likely to report errors. Those respondents making error reports were much more likely to report visit dissatisfaction than those not reporting them (odds ratio [OR] = 13.8, $p < .001$).

Discussion: Although patient reports of perceived errors might be useful to improve the patient experience of care, they cannot be used to measure technical medical errors and patient safety reliably without added evaluation. This study's findings need to be replicated elsewhere before generalizing from one metropolitan region and a patient population that is about two-thirds members of one health plan.

know very little about the rate or epidemiology of errors or adverse events, especially in ambulatory care settings. There have been a few studies of physician self-report of errors[17,18] and some studies of drug-related adverse events in outpatient settings, but no measures have been identified that are comprehensive, much less repeatable.[19–25]

Little advantage has been taken of the patient's experience or viewpoint to address these patient safety issues beyond anecdotes and surveys. The Kaiser Family Foundation has now conducted three biannual national surveys of consumers' views of patient safety and quality.[26] A growing proportion (31% to 55%) report that they know what the term *medical error* means, 43% report that preventable medical errors occur often, and, in 2004, 34% said that they or a family member had been involved in a situation where a preventable medical error was made. An earlier national Gallup poll found that 40% of respondents reported experiencing a medical mistake themselves; the most frequent subcategory (25%) reported a wrong diagnosis or treatment by a doctor.[27] Until the recent report by Weingart et al. for oncology outpatients, there have been no studies of patient surveys as a way to learn about medical errors.[28]

Our health plan and medical group have been using patient satisfaction surveys for several years as a means to gather information about patient-perceived medical errors and to report comparative error rates among medical groups, individual clinics, and hospitals. However, because no details about these reports of errors have been available, it has been unclear what these rates mean or how to lower their frequency. Therefore, we studied a sample of responses in detail to learn what patients mean when they report errors, whether there is harm, and whether such surveys might be used as a repeatable comparative measure of patient safety.

Methods

Setting

This study took place in HealthPartners Medical Group, a 600-physician multispecialty group in the Minneapolis-St. Paul metropolitan area that provides care to about 400,000 active patients. Two thirds (64%) of these patients are covered by one health plan; 16% by other plans; and 20% by Medicare, Medicaid, self-pay, or Workers' Compensation. The entire study was reviewed, approved, and monitored by the appropriate Institutional Review Board.

Definition of Errors

For this study, we used the IOM definition of *errors* as "the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim,"[1(p. 3)] and *safety* as "freedom from accidental injury,"[(p. 3)] highlighting that not all errors result in harm.

Research Survey Sample

The research survey sample was drawn in the same way as the sample has been routinely drawn for the medical group's monthly patient satisfaction survey. Names were selected randomly from adults (age 18 years and older) or parents of children younger than 12 years of age with an office visit to a medical group physician (primary care or specialty) in the preceding two weeks. The age group from 12 to 17 years was eliminated because of confidentiality concerns, as were patients who had requested that no surveys be sent to them. No more than eight patients were sampled per physician.

Questionnaire

The two-page questionnaire contained eight questions, most of which were taken directly from the usual patient survey regarding satisfaction and demographic information. The following question about errors was also the same as has been used for several years in this questionnaire:

> HealthPartners Medical Group is committed to providing care that is safe and free of all avoidable errors. We'd like to better understand if you had concerns while receiving care at this clinic within the last year (for either you or your family) regarding:
>
> a. A wrong diagnosis
> b. A wrong treatment
> c. A wrong prescription
> d. A wrong procedure
> e. Other

To provide further information for this study, if any of these five usual items were answered "Yes," an added follow-up question asked what happened and on what date, and another question asked whether any of the error(s) noted had caused harm. We also added a section to obtain signed permission for us to review the medical record and to call the respondent if further details were needed.

These questionnaires were mailed with a modified cover letter that added an explanation of the nature of this research project. After two weeks, nonresponders were then called (up to six attempts) to obtain answers to the questions over the phone.

Review System

A two-stage review system was used to judge the error reports, similar to that used in the national studies cited in the IOM report on errors.[2–4] However, rather than have the physician reviews limited to those cases with a positive nurse screen for potential errors, at least one physician reviewed each case after the nurse screen, with review by two physicians if the first one identified a potential error.

Nurse and Physician Review. All questionnaires that contained any response to the error questions were routed for review by the nurse who normally handles patient complaints about medical care [A.M.H.]. If there was consent and it was relevant to do so, she reviewed the record before recording her judgment about the category of complaint and about whether the complaint might require review by the normal peer review process for medical errors. A standardized classification scheme was used by all three reviewers.* However, the record was not reviewed for cases that involved an appointment scheduling problem or a communication issue because the record was unlikely to provide additional information. We simply assumed that these complaints were valid. After initial nurse review, both the patient-completed survey and the nurse review form were sent to one of two experienced primary care physicians [B.M.A. or L.I.S.], who also reviewed the record when needed, if the consent form was signed. Ambiguous cases were discussed among the three reviewers, and the patient/parent was called if further information was needed. Cases with differences of opinion about the category to be used were discussed among the reviewers until agreement was reached. Finally, when the patient indicated that the reported error resulted in harm, a single reviewer [L.I.S.] estimated the likelihood and severity of harm for each case. If harm might have occurred, it was first classified as physical harm versus mental/emotional harm and then as either minor/temporary or major/permanent; these judgments were based on information in the survey and record.

Subsequent Peer Review. Next, possible or probable medical error cases were reviewed by the department's chair to determine whether the case should undergo formal committee peer review. If the chair had any quality concern, we also obtained the patient's phone permission for this committee review, and some patients declined such action. The remainder did go through formal committee evaluation. In the absence of any generally agreed-on coding system for these error reports, we developed our own on the basis of personal experience, the literature, and the needs identified from the cases reported.

* The scheme's categories can be found in Table 2 (page 270).

Data Analysis

We computed prevalence rates for each reported error type, in relation to both the survey question categories and the review schema. Prevalence rates were also computed separately for respondents by gender, age, race, and survey method (mail or phone). Contingency tables and Chi-square statistics were used to compare rates across these respondent types. Finally, we calculated the association between satisfaction with care and report of errors, both overall and for reports of medical versus service errors.

Results

Respondents

In July 2005, 3,109 surveys were mailed. We received 1,024 completed surveys by mail and 974 by telephone, for a total response of 1,998. By eliminating undeliverables, the adjusted response rate was 65.1%. Adjusted response rates among adult patients increased with age, with rates varying from 50.3% for those aged 18–30 years to 80.8% among those 65 years and older ($p < .0001$). Parents and guardians receiving a mailing on behalf of their children's medical visit had an adjusted response rate of 69.3%, compared with 64.5% ($p = .03$) for adults responding based on their own visits. No complaints or legal actions were generated by the survey.

Out of the 1,998 respondents, 237 made some comment in the error question section, for a rate of 11.9%, and the checked error types suggested that a total of 328 incidents were being reported. However, 18 of these respondents wrote things like "I like my doctor" or reported incidents before the one-year time frame asked about in the survey. Because many respondents checked multiple categories for single incidents, this narrowed the number of reported incidents from the remaining 219 individuals down to 247 separate incidents, for a respondent rate of 11.0% and a rate of 12.4/100 respondents. Because the survey question asked about any errors in the respondent's family, the actual rate is much lower.

Types of Reported Errors

Of the 219 individuals who reported errors, 73 (33.3%) individuals describing 82 incidents did not sign the consent form to permit review of medical records, a proportion similar to our experience with other studies. However, 51 of these problems had enough information to be classified. Consent rates for record review did not differ by gender, age group, or race.

The setting of the 247 error reports was as follows:

- Primary care: 114

- Specialty care: 69
- Pharmacy: 18
- Urgent care: 12
- Hospital: 7
- External to our care system: 5
- Billing: 2
- Emergency department (ED): 2
- Centralized call center: 2
- Not clear: 11

Adjusting for volume of visits, this meant that there were 2.65 reports/1,000 visits in primary care, 1.54 in behavioral health, 1.65 in obstetrics-gynecology (Ob-Gyn), and 1.12 in other specialties.

The demographic characteristics and response type are listed in Table 1 (right) for those respondents who reported errors versus those who did not. The attributes are provided for survey responders and not the household member who had the recent medical visit (for child patients) or the individual(s) who experienced the perceived medical error(s). Females and those aged 41–60 years made up a larger proportion of those reporting errors.

Table 1. Characteristics of Respondents by Error-Reporting Status

Characteristic	% Reporting Errors	% Not Reporting Errors	% of Total Respondents
n	219	1779	1998
Survey completion:			
By mail	52.5%	51.1%	51.3%
By phone	47.5%	48.9%	48.8%
Age (years):*			
< 21	10.2%	14.2%	13.8%
21–40	25.1%	23.1%	23.4%
41–60	41.4%	32.4%	33.4%
61+	23.3%	30.2%	29.5%
Female*	73.6%	65.4%	66.3%
Race/Ethnicity:			
White	82.0%	81.4%	81.5%
Hispanic	6.6%	3.6%	4.0%
African-American	7.6%	8.2%	8.2%
Asian/Pacific	1.9%	3.6%	3.4%
American Indian	0%	0.4%	0.3%
Mixed	1.9%	2.5%	2.4%
Other	0%	0.3%	0.3%

* $p < .05$

A breakdown of the frequencies of each type of the 247 patient-reported errors after medical and record review are reported in Table 2 (page 270), as well as the review-assessed frequency, type, and severity of any reported harm. The medical reviewers most often (45%) considered patient-reported errors to represent "misunderstandings." In most of these, the medical record showed that the care appeared to be appropriate, even though the patient believed that the diagnosis or treatment actions were incorrect. Examples include patient questioning medication dosage (within the normal range), slow resolution of symptoms (not unusually so), and claims of being told of a diagnosis or test result (no record of such). The "misunderstanding" category of "clinician unhelpful" was used where the patient reported that the clinician misunderstood or did not address his or her main concern or question.

Another 20% of these reported errors appeared to represent complaints about "behavior or communication" problems by medical group personnel. Most of these involved waiting times, clinician/staff rudeness, or inadequate explanations. "Technician care" concerns represented reports of technicians who did not appear competent, for example, in drawing blood. The three cases in which physical harm was alleged reflected the feeling that pain had been inadequately addressed.

Some reported errors (13%) remained unclassified because of "inadequate information," reflecting the fact that consent for record review or contact was not signed and the survey report did not contain sufficient information. Another 2.8% could not be classified despite record review.

Reviewers were only able to consider 19% of the reported incidents as possible errors in terms of the IOM definition, either as "medical" or "nonmedical errors." Half of the "medical errors" concerned incorrect medication fills. The 14 cases of possible or probable clinician error on initial review ranged from delayed or missed diagnoses[6] to inappropriate treatment, but only 7 of them claimed any harm and 5 of those cases were eventually determined to be without error by the department head. Six cases went to a formal peer review committee that judged 4 of those to be free of error. The one patient with a complaint that reviewers considered a probable error did not want the case to go to peer review. Thus, only 5 (2%) of 247 reports were finally judged as real clinician medical errors (2 from department head judgment, 2 from peer review, and 1 from reviewers where the patient declined formal review).

Associations with Types of Reported Errors

Among the 247 reports, 72 (29.1%) were reported by the

Table 2. Classification of Patient-Reported Errors After Medical Review (*n* = 219 patients and 247 errors)

Category	Number of Errors Reported	Column (%)	Patient-Reported Harm* (Row No. & %)	Review Suggests Physical Harm (Number)	Review Suggests Mental Harm (Number)
A. Medical Error	**26**	**10.5%**	**9 (34.6%)**	**6**	**3**
Pharmacy	12	4.9	2 (16.7)	1	1
Possible clinician error	13	5.3	7 (53.9)	5	2
Probable clinician error	1	0.4	0	0	0
B. Nonmedical Error	**22**	**8.9%**	**2 (9.1%)**	**0**	**2**
Insurance or billing	7	2.8	1 (14.3)	0	1
Scheduling	6	2.4	0	0	0
Wrong information	6	2.4	0	0	0
Prescription delay	2	0.8	1 (50.0)	0	1
Test results delay	1	0.4	0	0	0
C. Behavior/Communication	**49**	**19.8%**	**11 (22.4%)**	**3**	**8**
Waiting time	18	7.3	2 (11.1)	0	2
Clinician disrespect	11	4.5	5(45.5)	1	4
Staff disrespect	8	3.2	1 (12.5)	0	1
Felt rushed	4	1.6	2 (50.0)	1	1
Technician care	2	0.8	1 (50.0)	1	0
Other	6	2.4	0	0	0
D. Misunderstanding	**112**	**45.3%**	**40 (35.7%)**	**26**	**14**
Medical care	71	28.7	26 (36.6)	18†	8
Medication side effects or adverse reaction	15	6.1	8 (53.3)	7	1
Clinician unhelpful	11	4.5	4 (36.4)	1	3
Scheduling	7	2.8	1 (14.3)	0	1
Ordering	4	1.6	1 (25.0)	0	1
Insurance coverage	3	1.2	0	0	0
Missing documentation	1	0.4	0	0	0
E. Inadequate Information	**31**	**12.6%**	**8 (25.8%)**	**7**	**1**
F. Unable to Determine Despite Consent	**7**	**2.8%**	**2 (28.6%)**	**1**	**1**
TOTAL	**247**	**100%**	**72 (29.1%)**	**43**	**29**

* Refers to respondent report of harm from a reported error. Where this was reported, the next two columns represent reviewer judgment about the type of harm.
† One case of 18 in this category indicated major/permanent physical harm. All other harm reports in the table are of minor/temporary harm.

respondent to have caused harm, which the reviewer categorized as physical in 43 cases (60%) and mental (mostly emotional distress) in the other 29 cases. In only 1 case did the reviewer think that the harm could have been considered as major or long term. Harm was most often claimed by patients for errors classified as a "misunderstanding by reviewers."

In Table 3 (page 271) we report the probability of reports of errors (as well as different types of reported errors) by attributes of the respondents. Respondents by mail were more likely to report "behavior/communication" problems, whereas those reporting by phone were more likely to report what ended up as "misunderstandings." Although women were more likely to report "misunderstanding" types of error, gender was unrelated to other error types. Reports of any errors, "medical" errors, and "behavior/communication" problems increased with age until 60 year of age. The only race or ethnicity relationship was that Hispanics were more likely to report any errors and were more likely to report "behavior/communication" problems.

Although respondents reporting errors were less satisfied with care than those who did not, this was much more true of

Table 3. Likelihood of Reporting an Error by Respondent Characteristics (denominator *n* = 1998)

Characteristic	% Reporting Any Errors	% Reporting Medical Errors	% Reporting Nonmedical Errors	% Reporting Behavior or Communication Issues	% Reporting Misunderstanding
n of respondents*	219	25	22	47	104
Survey completion:					
By mail	11.2%	1.5%	1.5%	3.2%‡	4.2%†
By phone	10.7%	1.0%	0.7%	1.4%‡	6.3%†
Age (years):					
< 21	8.1%†	0%‡	0.7%	1.1%†	4.4%
21–40	11.7%†	1.1%‡	1.1%	3.7%†	4.8%
41–60	13.5%†	2.6%‡	1.2%	3.0%†	6.8%
61+	8.6%†	0.5%‡	1.0%	1.0%†	4.3%
Female	12.1%†	1.2%	1.1%	2.7%	6.0%†
Male	8.5%†	1.4%	1.1%	1.5%	3.8%†
Race/Ethnicity:					
White	10.9%	1.5%	1.1%	2.3%	5.2%
Hispanic	18.2%	0%	2.6%	6.5%	7.8%
African-American	10.1%	0%	0%	1.3%	5.7%
Asian/Pacific	6.0%	0%	1.5%	3.0%	1.5%
American Indian	0%	0%	0%	0%	0%
Mixed	8.5%	0%	0%	2.1%	6.4%
Other	0%	0%	0%	0%	0%
Race/Ethnicity					
Hispanic	18.2%†	0%	2.6%	6.5%†	7.8%
Nonhispanic	10.5%†	1.3%	1.0%	2.1%†	5.1%

* This is the number of people with each kind of error but not the denominator for the column. Errors concerning "inadequate information to describe error" and "can't determine error despite consent" are not included as separate columns in this table but are included in the total error column in Table 2. Because of this and because respondents could report more than one kind of error, rows will not add to the "% Reporting any errors" column.

† $p < .05$.

‡ $p < .01$.

those whose reported error occurred at the time of the visit for which satisfaction was being questioned (dissatisfied versus neutral/agree, odds ratio [OR] = 16.9; 95% confidence interval [CI]: 10.3–27.7) than for earlier visits unrelated to the question (OR = 3.9; 95% CI: 1.7–8.9; Table 4, page 272). For errors associated with the reference visit that were classifiable as service–related or medical care–related, Table 5 (page 273) shows higher levels of dissatisfaction for those reporting errors. Service-related error reports were directionally but not statistically significantly more highly associated with dissatisfaction (OR = 11.3; 95% CI: 6.6–19.5) than were medical care–related error reports (OR = .9; 95% CI: 4.0–11.9).

Discussion

This study suggests that few of the errors reported on a survey specifically asking about personal or family experiences actually represent what medical professionals would consider to be technical medical care errors. Nearly all the error reports alleging improper technical medical care turned out after investigation to be misunderstandings of appropriate care, and the rest were either nonclinician errors or dissatisfying behaviors or communications. About 15% could not be evaluated, mostly because lack of patient consent prevented us from obtaining additional information about the situation. However, none of this latter group had complaints that appeared to represent major issues, and some of these respondents noted that they did not consent because they did not want to cause problems for their clinician.

These findings are similar to those recently reported by Weingart et al. for 193 oncology outpatients.[28] Their methodology was somewhat different—employing volunteers to interview patients to ask if they had experienced any care they perceived as unsafe and using two reviewers to code the open-ended responses, but without review of pertinent medical

Table 4. Relationship Between Patient Report of Errors and Satisfaction With Care

"Overall, I was satisfied with this visit"	Not reporting errors	Reporting error associated with reference visit*	Reporting error associated with other visit†	Reporting error but date is unknown‡
n	1779	100	65	54
Disagree	3.1%	34.7%	10.9%	16.7%
Neutral	2.2	4.1	9.4	11.1
Agree	94.8	61.2	79.7	72.2

* Date of the reported error was in the month from which the sample was drawn. Table $p < .001$.
† Date of the reported error was from 1–12 months prior to reference visit.
‡ No date was provided for the reported error.

records. Although they found a much higher rate of unsafe incident reports (43% of respondents and 63 incidents/100 respondents), they concluded that only 2% of incidents were adverse events, 3% were close calls, and 12% were errors without risk of harm. The other 84% of reports were classified as service quality incidents involving the same types of problems we encountered—waits and delays, poor communication and coordination, environmental issues, and poor behavior/lack of respect. Because these patients were all receiving chemotherapy infusions, they were at much greater risk of harm directly from their medical care.

Of course, if the health care professionals in our setting or the chemotherapy unit were more attuned to these patient concerns or to the behavior/communication category harms reported, they likely could have reduced patient dissatisfaction considerably. The general types of issues we found and their reported impacts on the patients were similar to those of several smaller qualitative studies in the literature.[29,30]

In a random survey of Colorado physicians and the general public, Robinson et al. found that although 68% of the public felt that quality of care in the United States was a significant problem, only 29% of physicians agreed, but when asked whether the IOM estimate of 44,000 to 98,000 deaths from errors in hospitals was accurate, only 19% of the public and 14% of physicians agreed.[31] A similar national survey by Blendon et al. found that 60% of the public and 63% of physicians believed that the number of hospital error deaths was 5,000 or fewer, and only 10% of either group thought that it could be 100,000 or more.[32] Yet 35% of physicians and 42% of the public said that they or someone in their family had experienced a medical error, and 18% and 24% respectively said that the error had caused death, long-term disability, or severe pain. A similar rate of preventable medical errors among family members was reported in a recent survey of Alberta residents and a lower rate in a New York survey.[33,34] The results of the current study raise questions about the meaning of these survey findings.

We do not interpret these results to mean that patients should not be surveyed about their care experiences or even about their perceptions of errors experienced. Nonetheless, the results do suggest that it would be erroneous to simply report the rates of those reports as performance measures of either technical medical care errors or patient safety. An additional reason for this conclusion is that there may be many errors that patients are never aware of, so even if their reports were accurate, such a count would necessarily underestimate total errors. A patient survey might be more useful if it specifically asked about some of the other types of problems that we identified, along with more specific questions about any perceived medical errors.

However, these results do show that about 10% of patient families have been unhappy enough with some aspect of their ambulatory medical care in one care system in the past year to report experiencing an error when asked. This reinforces the need for more attention to patient perceptions and concerns, as well as to correcting the problems to which our care is still subject. It is clear that when patients report a medical error, the real problem usually lies with provider or staff communication or explanation. It is also clear that there is a strong association between dissatisfaction with care and the perception of an error. Because that association is at least directionally stronger for service problems than for technical medical care issues, it is important to improve service and the patient experience. A comparison of patient assessment of the quality of his or her primary care compared with record review showed very weak correlations.[35]

This study's findings need to be replicated elsewhere before generalizing from one metropolitan region and a patient popu-

Table 5. Relationship Between Type of Error and Satisfaction with Care*

"Overall, I was satisfied with this visit"	No error reports associated with visit	Error report about visit-associated medical care	Error report about visit-associated service issues
n	1912	49	37
Disagree	4.0%	29.2%	41.7%
Neutral	2.7%	4.2%	0%
Agree	93.3%	66.7%	58.3%

* Table $p < .0001$

lation that is about two-thirds members of one health plan. The findings are also limited by the fact that all judgments and classifications were made by only three people in the absence of any generic coding scheme. Importantly, the reports represent a time and place impression by patients of the term *error* that may have a different connotation elsewhere or later. However, if they are interpreted as evidence of dissatisfaction with care, their value and utility for improvement may be greater.

As a result of this study, our health plan and medical group are discontinuing the use of these questions as a way to measure patient safety and to compare error rates among care providing medical groups and hospitals. That forces us to work harder on the service and communication problems that appear to be common. It also requires that we identify some alternative measure of patient safety because we still believe that errors and patient safety are serious problems that deserve priority attention and a way to measure change over time. In his review of what we have learned five years after publication of *To Err Is Human*, Leape said that "improvement of the magnitude envisioned by the IOM requires a national commitment to strict, ambitious, quantitative, and well-tracked national goals."[36(p. 2384)] This study suggests that we must still search for a satisfactory quantitative measure of patient safety. J

Leif I. Solberg, M.D., is Associate Medical Director for Care Improvement Research, and **Stephen E. Asche, M.A.,** is Statistician, HealthPartners Research Foundation, Minneapolis. **Beth M. Averbeck, M.D.,** is Associate Medical Director for Care Improvement, HealthPartners Medical Group, Minneapolis, and **Anita M. Hayek, R.N., B.S.N.,** is Sr. Quality Peer Review Coordinator. **Kay G. Schmitt, M.S.,** is Director, Market Research & Strategic Information, HealthPartners, Minneapolis. **Tim C. Lindquist, R.N.,** is Director of Performance Improvement, HealthPartners Medical Group. **Richard R. Carlson, M.S.,** is Lead Health Care Analyst, Medical Health Plans, Minneapolis. Please address correspondence to Leif I. Solberg, Leif.I.Solberg@HealthPartners.com.

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